Hood Canal Summer Chum

"Ecologically, summer-run chum salmon populations from Washington must return to fresh water and spawn during periods of peak high water temperature, suggesting an adaptation to specialized environmental conditions that allow this life-history strategy to persist in an otherwise inhospitable environment." *FR63; March 10, 1998*

Chum Life History

In addition to the prominent fangs that have given them the nickname "dogs," chum salmon are known for the striking calico pattern of spawning males, which exhibit a bold, jagged reddish and black line along their flank. Chum salmon are second only to Chinook salmon in adult size, with individuals reported up to 43 inches in length and 46 pounds in weight. The average size for the species is around 8 to 15 lbs.

Chum salmon spend more of their life history in marine waters than any other Pacific salmonid species. Juvenile chum migrate to saltwater almost immediately after emerging from gravel, thus their continued survival depends substantially on estuarine conditions (unlike other salmonid species that depend extensively on fresh-water habitat). Also unlike other salmon species, chum salmon form schools, a characteristic that is presumed to help them reduce predation.

Photo by Rene Neff

Spawning, Emergence, Estuarine Rearing and Migration

Chum salmon usually spawn in the lower reaches of rivers, probably due to their lack of persistence in overcoming blockages and falls. Although chum may migrate upstream for over 100 miles on some river systems, most of these rivers are low gradient and without substantial blockages. Redds are usually dug in the mainstem or in side channels of rivers beginning just above tidal influence. Some chum salmon even spawn in intertidal zones of streams at low tide, particularly where groundwater upwelling is present. Most chum salmon mature between three and five years of age, with 60 to 90 percent of the fish maturing at four years of age.

Some scientific observations of chum suggest that the returning adults have a greater tendency to stray to other river systems than other salmonids. This is thought to be due to a number of possible factors such as

their spawning location near the mouths of rivers, which does not afford the juveniles the long downstream migration undertaken by other species during the process of imprinting. Additionally, chum enter streams when they are sexually mature and may not be able to endure a delay, leading them to spawn at the first available location. Additional studies on straying by chum have been inconclusive, and are affected by hatchery releases.

The timing of hatching and the young fry's emergence from gravel varies by stream temperature, dissolved oxygen level, gravel size, salinity and nutritional conditions. Summer chum eggs and alevins (juveniles with egg-sac attached) develop in the redds for approximately 18 - 20 weeks before emerging as fry between February and the last week of May. Outmigration to saltwater may take only hours or days where the spawning sites are close to the river mouth. Estuarine residency is the most critical phase in the life history of chum. They remain close to the surface, rearing in shallow eelgrass beds, tidal creeks, sloughs or other productive estuarine areas for several weeks between January and July.

Although migratory information on chum is limited, both Asian and North American chum are found in the North Pacific and Bering Sea. North American chum salmon are rarely found west of the mid-Pacific ocean, while Asian-origin chum have been shown to migrate eastward of that point. After two to four years in the northeast Pacific ocean, Puget Sound-origin chum reaching maturity follow a southerly migration path parallel to the coastline of southeast Alaska and British Columbia.

In Washington State, fall-timed runs of chum predominate, generally returning to their streams of origin from October to November. However, distinct summer runs of chum in Hood Canal and the eastern Strait of Juan de Fuca spawn from late August to mid-October.

Characteristics of Hood Canal Summer Chum

Data as far back as 1913 have shown a well-defined timing separation of summer and fall runs in Hood Canal, even within the same river system. Despite hatchery releases, a strong temporal separation remains. Hood Canal summer chum spawn soon after they enter freshwater in the lowest reaches of their natal streams. Ninety percent of summer chum in the Quilcene River spawn in the lowest mile. In Salmon Creek the summer chum also spawn within the lowest mile, and in Snow and Jimmycomelately Creeks they spawn in the lowest one-half mile.

Genetic data indicate a strong and long-standing reproductive isolation between Hood Canal summer chum and other chum populations in the United States and British Columbia. Summer chum populations are rare in the southern portion of the specie's range. The high water temperatures and low streamflows in the late summer and early fall are unfavorable for salmonids south of northern British Columbia. The ability of Hood Canal Summer Chum to persist in the face of such hostile conditions led the NMFS Biological Review Team to conclude that these populations contribute to the ecological and genetic diversity of the species as a whole. Although a few summer-run populations are also present in southern Puget Sound, the genetic data indicate that the summer-run populations of Hood Canal and the eastern Strait of Juan de Fuca are part of a much more ancient lineage.

"The Washington Harbor [Klallam] people fish for dog salmon in a creek near Blyn. The chief owns the trap at the mouth of the creek."

Gunther, 1927

Status of the Hood Canal Summer Chum Populations

"Hood Canal and Strait of Juan de Fuca summer chum experienced a severe drop in abundance in the 1980's, and returns decreased to all time lows in 1989 and 1990 with less than a thousand spawners each year," (WDFW/PNPTT, 2000). In response to this alarming decline, the state and tribal co-managers began to implement harvest management actions in 1992 to protect summer chum, and worked with the US Fish and Wildlife Service and citizen groups to initiate hatchery supplementation and re-introduction programs. These combined efforts, known as the "Summer Chum Salmon Conservation Initiative," appear to have contributed to substantial increases of returning summer chum to some streams in the late 1990's. Although the NMFS Biological Review Team acknowledged that the Initiative represented a positive step for the recovery of the ESU, they continue to consider the ESU as likely to become

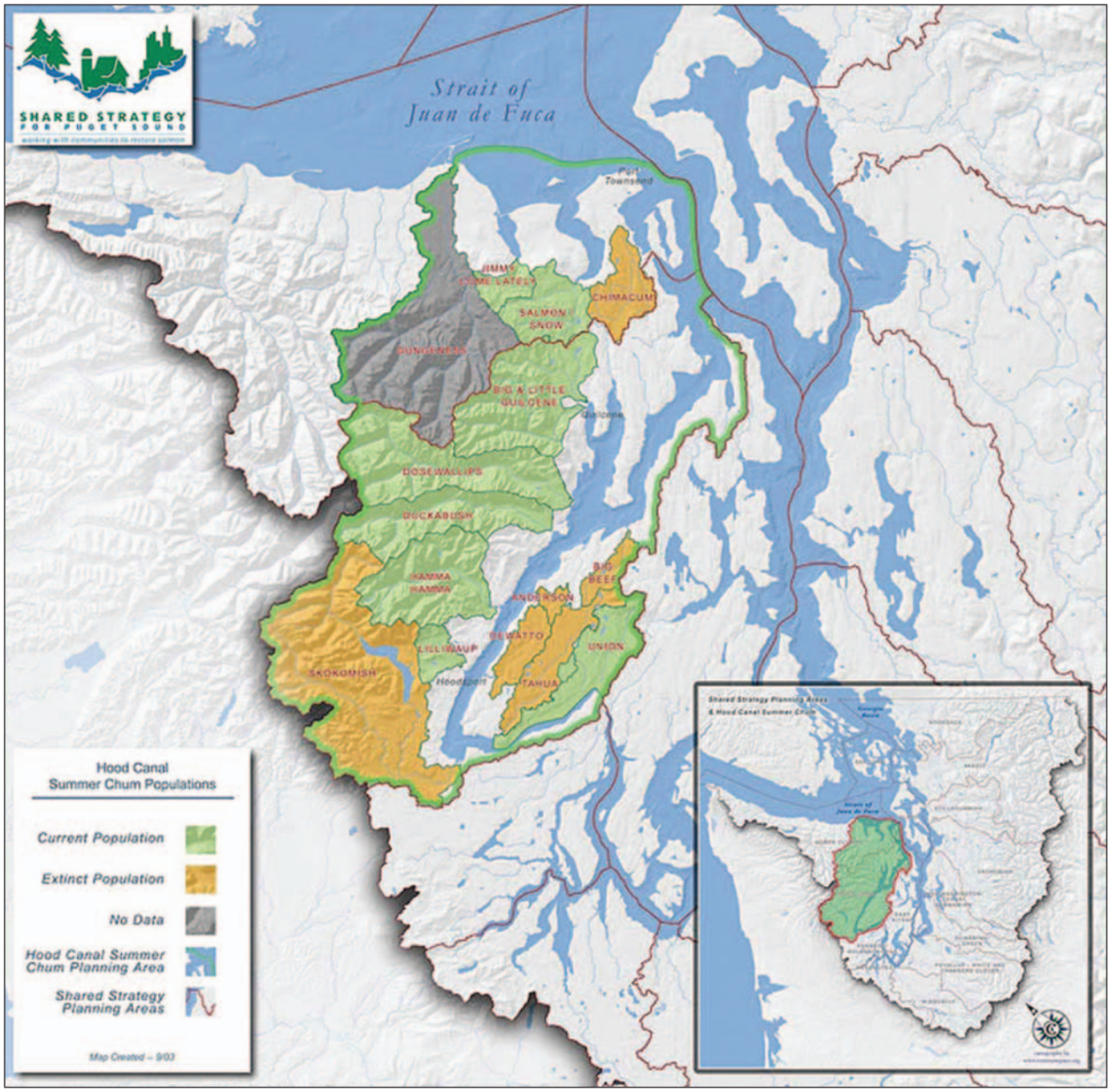

Figure 2.10 Hood Canal Summer Chum Populations and ESU

endangered due to the widespread loss of estuary and lower floodplain habitat, negative interactions with hatchery fish, and high predation by marine mammals. (BRT 2003)

The Hood Canal Summer Chum Evolutionary Significant Unit

The Hood Canal summer chum salmon ESU includes all naturally spawned populations of summer-run chum salmon in tributaries to the Hood Canal, and in Discovery Bay, Sequim Bay, and the Dungeness River on the Strait of Juan de Fuca (See Figure 2.10).

Sixteen historic populations comprise the Hood Canal summer chum ESU, of which eight currently have existing runs, (see Figure 2.11). Most of the populations which have become extirpated occur on the eastern side of Hood Canal.

Six projects to supplement existing populations and two reintroduction projects are part of the Summer Chum Salmon Conservation Initiative, with the largest supplementation program at the Big Quilcene River fish hatchery. Reintroduction programs have been initiated in Big Beef and Chimacum creeks, where the historical populations are thought to be extinct.

Recent Population Abundance and Trends

The recent abundance of summer chum in Hood Canal and Strait of Juan de Fuca streams ranges from a geometric mean of 10 spawners in Jimmycomelately Creek to just over 4,500 in the Big/Little Quilcene (Figure 2.12). The analysis of long term population trends by the NMFS Biological Review Team indicated that only two naturally spawning populations (Quilcene and Union) are increasing, and the Quilcene's positive growth rate is almost surely due to active supplementation programs. The median long-term trend for the productivity of extant populations is 0.94 (a growth rate of 1.0 indicates that a population or group of populations is just replacing itself). Long term trends are generally computed based on data going back to the early 1970's.

In contrast to the declining long-term trends, most of the naturally spawning populations of Hood Canal summer chum have shown improving productivity in the recent short term. Seven of the eight extant populations in the ESU have been increasing from 1990-2002, reflecting supplementation programs and possible improvements in recent ocean conditions.

Spatial Distribution of Natural-Origin Spawners

Status Reviews of Hood Canal summer chum in 1997 and 2003 indicated concern that most of the historical summer chum stocks on the east side of Hood Canal have been extirpated. The increasing urbanization of Kitsap County was also cited as a threat to the potential to retain or reintroduce sum-

Population	Status	Supplementation/Reintroduction Program
Union River	Extant	Supplementation program began in 2000
Lilliwaup Creek	Extant	Supplementation program began in 1992
Hamma Hamma River	Extant	Supplementation program began in 1997
Duckabush River	Extant	---
Dosewallips River	Extant	---
Big/Little Quilcene River	Extant	Supplementation program began in 1992
Snow/Salmon Creeks	Extant	Supp. program began in 1992 in Salmon
Jimmycomelately Creek	Extant	Supplementation program began in 1999
Dungeness River	Unknown	---
Big Beef Creek	Extinct	Reintroduction program began in 1996
Anderson Creek	Extinct	---
Dewatto Creek	Extinct	Natural re-colonization occurring
Tahuya River	Extinct	---
Skokomish River	Extinct	---
Finch Creek	Extinct	---
Chimacum Creek	Extinct	Reintroduction program

Figure 2.11 Historical populations of summer chum in the Hood Canal ESU (BRT 2003)

mer chum populations on the east side.

The Puget Sound Technical Recovery Team has preliminarily identified two aggregations of summer chum salmon in the ESU which may constitute independent populations. Stocks in the Hood Canal aggregation include the extant stocks originating in the Big/Little Quilcene, Dosewallips, Duckabush, Hamma Hamma, Lilliwaup and the Union watersheds, as well as those being supplemented in Big Beef Creek and the Tahuya River. The Strait of Juan de Fuca aggregation includes those extant stocks originating in Salmon/Snow Creeks, Jimmycomelately Creek, Chimacum Creek (supplemented stock), and any summer chum salmon that may be spawning in the Dungeness River.

Viability of the Hood Canal Summer Chum ESU

During the preparation of the 2003 update to the chum status review, members of the NMFS Biological Review Team were asked to rate each of the four VSP categories (abundance, productivity, spatial structure and diversity) with respect to the risk of extinction. Despite the recent gains in productivity due to supplementation programs, the Team voted overwhelmingly to retain the Hood Canal summer chum ESU in the "likely to become endangered" category.

Although a population viability analysis for summer chum salmon has not yet been completed, co-managers have continued to develop interim recovery goals with TRT participation. These goals are described further in the Hood Canal Summer Chum Recovery Plan being prepared by the Hood Canal Coordinating Council.

Population	Geometric mean escapement (1999-2002)	Long Term Trend (a value of 1.0 indicates that the population is replacing itself)	Short Term Trend
Union River	594	1.08	1.10
Lilliwaup Creek	13	0.88	1.00*
Hamma Hamma River	558	0.90	1.20
Duckabush River	382	0.91	1.14
Dosewallips River	919	0.96	1.25
Big/Little Quilcene River	4,512	1.05	1.62
Snow/Salmon Creeks	1,521	0.99	1.24
Jimmycomelately Creek	10	0.88	0.82*
* Supplementation programs at Jimmycomelately and Lilliwaup reduced the number of spawners released to achieve escapement naturally.			

Figure 2.12 Abundance and trends of growth/decline for extant populations of summer chum in the Hood Canal ESU (BRT 2003)